Aortic homografts: Unrealized expectations and hard reoperations at the end

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Cryopreserved aortic homografts have been considered an ideal alternative for aortic root replacement in young patients. Superior hemodynamics, resistance to infection, available extra tissue to reconstruct the root, avoidance of anticoagulation, and long-term durability are some of the advantages claimed by their advocates. Fifty-three years after their introduction by O'Brien and colleagues,¹ however, most of those claims have not been realized. In addition, the availability of homografts and the inherent challenges associated with their implantation and reoperation have limited their widespread use.

In this issue of the *Journal*, Nappi and colleagues² reported the experience of 4 surgeons, spanning 17 years, with 210 young patients who underwent aortic root replacement with cryopreserved aortic allografts. The findings of this report exemplify (1) the “unrealized expectations,” as the outcomes were at least similar to if not worse than those of replacement with biologic or mechanical valves, and (2) the “hard reality” of a difficult reoperation when the homograft deteriorates.

First, root replacement with a homograft is a technically demanding operation performed only a few times a year even by “experienced” surgeons. Nappi and colleagues² performed on average fewer than 4 procedures per surgeon per year during the study period. The high operative mortality (5.7%) and the prolonged crossclamp and bypass times (in excess of 3 and 4 hours, respectively) reflect the complexities and technical difficulties of these operations.

Second, the key of successful endocarditis treatment is radical débridement of all infected tissue.³ Although in the report of Nappi and colleagues² there was no early recurrence of endocarditis, and the freedom from late endocarditis was 98%, there is no conclusive evidence to sustain the contention that allograft tissue is more resistant to infection, or that in endocarditis it is associated with improved cure rate, lower recurrence rate, or improved survival relative to mechanical or biologic valves or to conduits.⁴⁻⁶

Third, superior hemodynamics and avoidance of anticoagulation are the only 2 of those promises that have been

Calcified homograft in the aortic root.

Central Message

Few of the claimed advantages of homografts have been realized, and patients are faced with difficult and risky reoperations when homografts deteriorate.

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realized. Lower gradients are observed in allografts than in mechanical or biologic prostheses.⁷ The clinical significance of these findings is unclear, however, because it is unknown whether they result in improved survival, reverse remodeling or symptoms. Avoidance of anticoagulation is particularly advantageous for women of childbearing age because it simplifies their management during pregnancy.

Fourth, because these patients are young, the likelihood of reoperation is very high. Structural valve deterioration, endocarditis, and technical failures are the most common reasons for reoperation. Structural valve deterioration usually presents as valve regurgitation in the second decade after implantation. This increased rate of reoperation in the second decade after implantation is consistently and predictably observed in all the published series,⁸ as it is in this current report of Nappi and colleagues.² Similarly, in this current report of Nappi and colleagues,² freedom from reoperation decreased from 84% at 15 years to 15% at 20 years. These rates of reoperation are hard to differentiate from the reported rates of reoperation of biologic valves and are clearly higher than the rates for mechanical valves.^{7,9,10}

Finally, once the homograft fails, the patient and the surgeon face the hard reality of a technically difficult and risky reoperation. Reoperations in patients with calcified homograft wall, leaflets, and coronary artery buttons require aggressive débridement, coronary mobilization and in many cases a redo root replacement (Figure 1). These

FIGURE 1. Calcified homograft in the aortic root.

procedures are associated with operative mortality of 2% to 18%,^{8,11} which is higher than the risk of reoperation after aortic valve replacement with mechanical or biologic valves.^{9,12} Although transcatheter aortic valve replacement may be a less risky approach in the absence of infection, long-term results have not been reported.

Let us conclude with the recognition that aortic homografts have a role in selected patients requiring root replacements, particularly young women requiring extensive root

reconstruction. The benefits of aortic homografts relative to bioprostheses and mechanical valves are limited and need to be weighed against the unavoidable and significant risk of reoperation.

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